

GN02072

PATENT

IN THE SPECIFICATION

Page 1, replace the section of lines 1-17 as follows.

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~~{ABSTRACT}~~

METHOD FOR CLEANING A NOZZLE PLATE

~~A method for cleaning a printhead wherein~~~~a solvent is applied followed by wet brushing of the nozzle plate to loosen debris collected on the nozzle plate.~~~~A cleaning solvent is applied which is removed by vacuum cleaning in order clean the plate. A movement of the cleaning solvent over the nozzle plate is provided.~~~~Both steps can be combined using the brush between the application of a single cleaning solvent and the vacuum cleaning. The movement of solvent helps to clean the brush.~~~~Different steps can be executed by a cleaning module having a relative translating movement to the head.~~~~Fig. 3~~

A method for cleaning the nozzle plate of an inkjet printhead includes the steps of: providing a solvent on the nozzle plate; loosening debris collected on the nozzle plate by brushing the nozzle plate in the presence of the solvent with a brush; applying a cleaning solvent to the nozzle plate; and subsequently removing the cleaning solvent and debris from the nozzle plate by vacuum cleaning. Application of the cleaning solvent and the subsequent removal of the cleaning solvent provides a movement of solvent over the nozzle plate.

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Page 2, replace the section of line 1 as follows.

-- [DESCRIPTION]

METHOD FOR CLEANING A NOZZLE PLATE --

Page 2, replace the section of lines 14-19 as follows.

-- Nowadays inkjet printing systems are used in a wide array of apparatuses and in a wide array of applications such as fax, colour photo printing, industrial applications, etc. In these printing systems inks, possibly of various colours, ~~is~~ are ejected out of at least one array of nozzles located in a printhead to the receiving material. --

Page 2, replace the section of lines 25-31 as follows.

-- To improve the clarity and contrast of the printed image, recent research has been focused to improvement of the ~~used~~ inks. To provide quicker, more waterfast printing with darker blacks and more vivid colours, pigment based inks have been developed. These pigment-based inks have a higher solid content than the earlier dye-based inks. Both types of ink dry quickly, which allows inkjet printing mechanisms to ~~forms~~ form high quality images. --

Page 3, replace the section of lines 1-4 as follows.

-- The combination of small nozzles and quick drying ink leaves the printheads susceptible to clogging, not only from dried ink and minute dust particles or paper fibres, but also from the solids within the new inks ~~ink themselves~~. --

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Page 3, replace the section of lines 24-36 as follows.

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- Application of solvents: By applying solvent ink, residue is dissolved and the printhead can be cleaned, ~~e.g.~~ as described in EP-A-1 018 430 herein incorporated by reference in its entirety for background information only.

- Wiping: Before ~~an~~ and during printing, the inkjet printhead is wiped clean by using an elastomeric wiper, removing ink residue, paper dust and other impurities.

- Different combinations of the above methods are known to clean the inkjet printheads.

In US 6 241 337, herein incorporated by reference in its entirety for background information only, wiping is performed combined with vibrations and application and removal of a solvent. ~~This method is due to the contact by the~~ The wiping action and the vibrations are especially abrasive for the nozzle plate.

In US 5 557 306, herein incorporated by reference in its entirety for background information only, ink is released from the nozzle plate, and the plate is brushed and wiped afterwards. Due to the wiping action, wear and tear of the nozzle plate is considerable. --

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Page 4, replace the section of lines 1-14 as follows.

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The system ~~describ~~ described in US 6 164 754, herein incorporated by reference in its entirety for background information only, uses only longitudinal cleaning with ~~a~~ an elastic pillar like member for cleaning the printhead having an indented groove with a nozzle section eventually combined with ~~a~~ an elastic. This gives an unsatisfactory result and may also result in damage to the printhead.

~~These~~ The features designed to clean and to protect a printhead, are commonly concentrated in a service station which is mounted within the plotter chassis, whereby the printhead can be moved over the station for maintenance. An example of such a service station can be found in US-A-6 193 353, herein incorporated by reference in its entirety for background information only, combining wiping, capping, spitting and purging functions.

As explained above cleaning actions, such as wiping, ~~which make contact with the head~~ cause considerable wear and tear upon the --

Page 4, replace the section of lines 21-22 as follows.

-- There is a need to provide cleaning methods for nozzle plates causing less wear and tear while providing sufficient cleaning ~~needs to be sufficient~~. --

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Page 4, replace the section of lines 27-32 as follows.

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~~The above mentioned advantageous effects are realized by a method having the specific features set out in claim 1. A method for conditioning a printhead is given in claim 8. An inkjet printing apparatus for using the method is given in claim 9. Specific features for preferred embodiments of the invention are set out in the dependent claims.~~

A method for cleaning the nozzle plate of an inkjet printhead includes the steps of: providing a solvent on the nozzle plate; loosening debris collected on the nozzle plate by brushing the nozzle plate in the presence of the solvent with a brush; applying a cleaning solvent to the nozzle plate; and subsequently removing the cleaning solvent and debris from the nozzle plate by vacuum cleaning. Application of the cleaning solvent and the subsequent removal of the cleaning solvent provides a movement of solvent over the nozzle plate.

Page 5, replace the section of lines 10-11 as follows.

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Fig. 4 shows a cleaning module having extra vacuum cleaning of through the brush. --

Page 5, replace the section of line 15 as follows.

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DETAILED DESCRIPTION OF THE INVENTION PREFERRED EMBODIMENTS --

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Page 5, replace the section of lines 28-31 as follows.

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The brushing step in presence of a liquid or solvent has the advantage that wet brushing is less abrasive ~~that~~ than dry brushing and ~~that the~~ wet brushing step is very effective in loosening debris collected on the nozzle plate. -

Page 6, replace the section of lines 1-2 as follows.

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very effective in removing debris ~~an~~ and ink residue from the nozzle plate and clearing the nozzles. --

Page 6, replace the section of lines 26-27 as follows.

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The second step is performed by moving a brush 3 over the nozzle plate 1. The brush 3 contacting the nozzle plate 1 consists of a woven --

Page 7, replace the section of lines 10-14 as follows.

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~~By the side ways~~ The movement of the solvent provides ~~also~~ a mechanical effect of the cleaning solvent dragging loose particles along the nozzle plate. Another fact is that due to the movement, dissolving of ink residues is improved. This can be contributed to the same effect causing that a solid is faster dissolved when ~~the~~ a solvent and solid are stirred. -

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Page 7, replace the section of lines 20-23 as follows.

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In a first step a solvent is applied to the nozzle plate 1 by a jetting means 4 or any other appropriate system. The solvent ~~will~~ serves two purposes, ~~i.e. solvent for enabling~~ to enable wet brushing and ~~it will~~ to serve as a cleaning solvent.

Page 9, replace the section of lines 1-3 as follows.

—

The brush 3 may be ~~a fixed but model~~, but especially when using very viscous inks, it may be more efficient to provide an automatic mechanism to renew the brush 3.

Page 9, replace the section of line 11 as follows.

—

- a take-in roll 10 for ~~enrolling~~ rolling up used brush fabric.

Page 10, replace the section of line 25 as follows.

—

A trade-off between wetting capability and dissolving power has ~~not~~ to

Page 10, replace the section of lines 32-36 as follows.

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Another aspect is that the volume of cleaning solution has to be balanced with the strength of the vacuum. When the vacuum is ~~to~~ too low, cleaning solution will be left on the printhead, while when the vacuum is ~~to~~ too low, not enough time is given to loosen and dissolve the dried ink and debris.

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Page 11, replace the section of lines 1-5 as follows.

When solvent is removed by vacuum, cleaning solvent ~~is~~ can be collected as a waste product for later removal. However in a more preferable embodiment the solvent is recycled and reused after e.g. filtering or other purification methods. This reduces waste generation of the printer. --

Page 11, replace the section of lines 8-16 as follows.

In order to generate the flow or movement of solvent over the nozzle plate 1, the cleaning solvent is preferably jetted onto the nozzle plate 1 by the solvent applying means 4 at an angle with the normal of the nozzle plate 1 between 0 ~~en~~ and 80 degrees.

This provides a good in depth cleaning of the nozzles 2 and enables the generation of the solvent flow over the nozzle plate 1. Direction of the jet can be adapted to desired cleaning speed or jetted volumes. The solvent flow is preferably between 5 to 200 ml/min ~~and in fed~~ through feed-through inlet 7. --

Page 12, replace the section of lines 5-7 as follows.

The first value is the minimum for removing the solvent while the second value results in good cleaning without extracting ~~to~~ too much ink from the nozzles 2 of the printhead. --

Page 13, replace the section of lines 27-28 as follows.

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- The applied volume of cleaning solvent is 45 ml/min ~~and in fed~~ feed-through inlet 12. --

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Page 14, replace the section of lines 1-3 as follows.

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The module 6 traverses over the printhead at a speed between 0.005 and 0.05 m/sec ~~with the~~ at a distance of 0.3 mm from the nozzle plate 1. --

Page 14, replace the section of lines 16-18 as follows.

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- To preserve the printhead in a ready state the printhead is brought in contact with a capping unit to prevent further contamination ~~an~~ and drying of ink in the nozzles 2. --

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